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REMOTE CONTROLLER

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REMOTE CONTROLLER

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Claim

A remote controller equipped with a modulator circuit which modulates a carrier wave signal based on a speech signal for remote control, a transmitter circuit which transmits a signal output from the aforementioned modulator circuit when a recognition request signal requesting recognition of the aforementioned speech signal is input, a receiver circuit which receives the signal transmitted by the aforementioned transmitter circuit, a carrier wave detector circuit which

outputs a recognition signal upon detecting the aforementioned carrier wave contained in a signal output from the aforementioned receiver circuit, a demodulator circuit which demodulates the signal output from the aforementioned receiver circuit so as to output the speech signal, a speech recognizer circuit which identifies the kind of speech signal output by the aforementioned demodulator circuit and outputs a control signal corresponding to the type identified only when the aforementioned carrier wave detector circuit has output the aforementioned recognition request signal, and a controller circuit which controls a target device to be controlled according to the control signal output by the aforementioned speech recognizer circuit.

Detailed explanation of the invention

Industrial application field

The present invention pertains to a remote controller used to control equipment, such as a television receiver, remotely by means of speech.

Prior art

In recent years, remote control has become a popular means to control electronic equipments; and, remote control by means of a speech is getting attention recently due to the ease of use.

An example of the aforementioned conventional remote controllers will be explained below with reference to the figures.

Figure 2 shows an example configuration of a conventional remote controller. In Figure 2, 12 represents a microphone for capturing the speech of a speaker, 13 represents a first modulator-transmitter circuit for transmitting a speech signal output from aforementioned microphone 12, 14 represents a speech signal transmitter circuit, 15 represents a push-button switch to be used by a user for requesting recognition, 16 represents second modulator-transmitter circuit for transmitting a recognition request signal, 17 represents a recognition request signal transmitter circuit, 18 represents a first receiver circuit for receiving the output from aforementioned speech signal transmitter circuit 14, 19 represents a second receiver circuit for outputting a recognition request signal upon receiving the output from aforementioned recognition request signal transmitter circuit 17, 20 represents a speech recognizer circuit which identifies the kind of speech signal output from aforementioned first receiver circuit 18 and outputs a control signal corresponding to the kind identified, 23 represents such a target device as a television receiver to be controlled remotely, 21 represents a controller circuit for controlling aforementioned target device 23 to be controlled according to the output from aforementioned speech recognizer circuit 20, and 22 represents a transmitter.

Operations of the remote controller configured in the aforementioned manner will be explained below using Figure 2.

To perform remote control, a user first utters a speech at microphone 12 while holding push-button switch 15 down. Speech signal transmitter circuit 14 captures the voice of the user using microphone 12 and modulates it for transmission. Recognition request signal transmitter circuit 17 modulates a recognition request signal indicating that push-button switch 15 is pressed and transmits it. Speech recognizer circuit 20 identifies which of the prescribed control speeches the speech signal received and modulated by first receiver circuit 18 belongs. For example, when the receiving channel of the television receiver is to be controlled, which of the terms for channel numbers "1," "2", ... "10" the speech signal transmitted by speech signal transmitter circuit 14 matches is identified. Here, because speech recognizer circuit 20 performs the recognition operation only when a recognition request signal is output, the probability of false operation can be reduced. Furthermore, speech recognizer circuit 20 outputs a control signal corresponding to the speech signal identified. Controller circuit 21 controls the applicable part of target device 23, such as a television receiver, to be controlled upon receiving the control signal output from speech recognizer circuit 20. In the case of the example given above, the receiving channel of the tuner circuit provided in the television receiver is switched according to the channel number identified by speech recognizer circuit 20.

Problems to be solved by the invention

However, used of the aforementioned configuration was subject to the following problems.

(1) Because two transmitter circuit, namely, speech signal transmitter circuit 14 and recognition request signal transmitter circuit 17, were involved, the power consumption was high. When the remote control was realized wirelessly, the transmitter utilized batteries as its power source, so that the battery life was shortened. Alternatively, when large-size batteries were used, the transmitter became larger and heavier.

(2) When only the recognition request signal was transmitted with no speech signal due to a transmission path failure or immediately after the power was turned on, oscillation of the modulator-transmitter circuit was unstable, and speech recognizer circuit 20 resulted in a misrecognition.

In the light of the aforementioned problems, the present invention offers a remote controller with a low transmitter power consumption without misrecognition by a speech recognizer circuit due to a transmission failure and/or unstable operation of the transmitter.

Means to solve the problems

In order to solve the aforementioned problems, the remote controller of the present invention is equipped with

a modulator circuit which modulates a carrier wave signal based on a speech signal for remote control, a transmitter circuit which transmits a signal output from the aforementioned modulator circuit when a recognition request signal to recognize the aforementioned speech signal is input, a receiver circuit which receives the signal transmitted by the aforementioned transmitter circuit, a carrier wave detector circuit which outputs a recognition signal upon detecting the aforementioned carrier wave contained in a signal output from the aforementioned receiver circuit, a demodulator circuit which demodulates the signal output from the aforementioned receiver circuit so as to output the speech signal, a speech recognizer circuit which identifies the kind of speech signal output by the aforementioned demodulator circuit and outputs a control signal corresponding to the type identified only when the aforementioned carrier wave detector circuit has output the aforementioned recognition request signal, and a controller circuit which controls a device to be controlled according to the control signal output by the aforementioned speech recognizer circuit.

Function

In the present invention, because the aforementioned configuration is used to transmit the recognition request signal in the form of the presence/absence of a carrier wave, only one transmitter circuit is required, so that the power consumption becomes 1/2 of that of the prior art. In addition, because no carrier wave is transmitted when recognition is not requested, the average power consumption over time can be reduced.

Furthermore, because no carrier wave is detected when no transmission signal is transmitted, or when it is unstable, no recognition request is sent to the speech recognizer circuit, so that no misrecognition takes place.

Application example

Remote controller of an application example of the present invention will be explained below with reference to the figures. Figure 1 shows block diagrams of the remote controller of an application example of the present invention.

In Figure 1, 1 represents a microphone for converting speech for remote control into an electric signal, 2 represents a modulator circuit for FM-modulation of a carrier wave according to a speech signal output from aforementioned microphone 1, 3 represents a push-button switch to be used by a user to request recognition, 4 represents a transmitter circuit which converts a signal output from aforementioned modulator circuit 2 into infrared for transmission only when

aforementioned push-button switch 3 is pressed to request recognition, 5 represents a receiver circuit which receives the infrared ray transmitted from aforementioned transmitter circuit 4 and outputs them after removing a noise element using a band-pass filter, 6 represents a carrier wave detector circuit which detects the carrier wave in the signal output from aforementioned receiver circuit 5 and outputs it as a recognition request signal, 7 represents a demodulator circuit which applies FM-demodulation to the signal output from aforementioned receiver circuit 5 for output, 8 represents a speech recognizer circuit which recognizes the kind of the speech signal output from aforementioned demodulator circuit 7 and generates a control signal corresponding to the kind identified only when a recognition request signal is output from aforementioned carrier wave detector circuit 6, 11 represents a target device such as a television receiver to be controlled remotely, 9 represents a controller circuit for controlling aforementioned target device 11 to be controlled according to the control signal generated by aforementioned speech recognizer circuit 8, and 10 represents a transmitter.

Operations of the remote controller configured in the aforementioned manner will be explained with reference to Figure 1.

To perform remote control, a user first utters a speech at microphone 1 while holding push-button switch 3 down. The speech signal converted into an electric signal by microphone 1 is FM-modulated by modulator circuit 2. The FM-modulated speech signal is transmitted in the form of an infrared ray only when push-button switch 3 of transmitter circuit 4 is pressed. Here, because recognition is requested of speech recognizer circuit 8 by pressing push-button switch 3, and the recognition request is transmitted in the form of the presence/absence of a carrier wave, only 1 transmitter circuit is required in order to transmit the recognition request signal and the speech signal, so that the power consumption can be reduced. Furthermore, because transmitter circuit 4 does not consume any power when push-button switch 3 is not pressed, the average power consumption over time can be reduced. On the other hand, at the receiving side, the transmitted signal received by receiver circuit 5 is rectified by carrier wave detector circuit 6 and compared with a threshold value so as to detect the presence/absence of a carrier wave in order to obtain the recognition request signal. Because the recognition request signal obtained is the logical product of the recognition request made by the user and the transmission condition, a misrecognition which would take place when the transmission condition is poor can be prevented.

Effect of the invention

As described above, because the present invention it is equipped with a modulator circuit which modulates a carrier wave signal based on a speech signal for remote control, a transmitter circuit which transmits a signal output from the aforementioned modulator circuit when a recognition request signal to recognize the aforementioned speech signal is input, a receiver

circuit which receives the signal transmitted by the aforementioned transmitter circuit, a carrier wave detector circuit which outputs a recognition signal upon detecting the aforementioned carrier wave contained in a signal output from the aforementioned receiver circuit, a demodulator circuit which demodulates the signal output from the aforementioned receiver circuit so as to output the speech signal, a speech recognizer circuit which identifies the kind of speech signal output by the aforementioned demodulator circuit and outputs a control signal corresponding to the type identified only when the aforementioned carrier wave detector circuit has output the aforementioned recognition request signal, and a controller circuit which controls a device to be controlled according to the control signal output by the aforementioned speech recognizer circuit, the power consumption of the transmitter can be reduced, and further misrecognitions due to a transmission failure and/or an unstable operation of the transmitter can be prevented.

Brief description of the figures

Figure 1 shows block diagrams of the remote controller related to an application example of the present invention, and Figure 2 shows block diagrams of the remote controller related to a conventional example.

1 ... microphone; 2 ... modulator circuit; 3 ... push-button switch; 4 ... transmitter circuit; 5 ... receiver circuit; 6 ... carrier wave detector circuit; 7 ... demodulator circuit; 8 ... speech recognizer circuit; 10 ... transmitter; and 11 ... target device to be controlled.

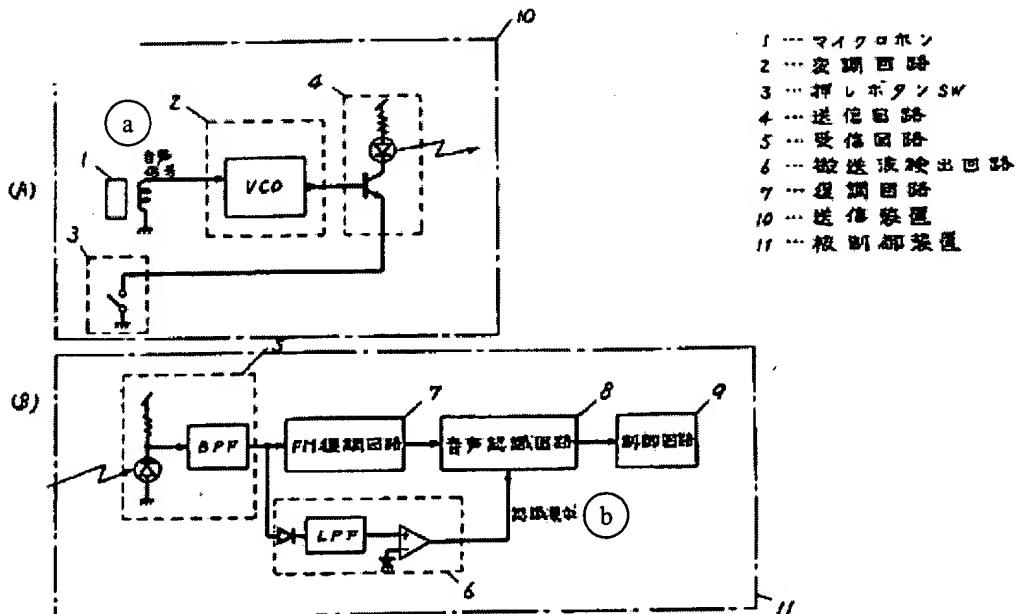


Figure 1

Key: a Signal
 b Recognition request
 1 Microphone

2 Modulator circuit
 3 Push-button switch
 4 Transmitter circuit
 5 Receiver circuit
 6 Carrier wave detector circuit
 7 FM demodulator circuit
 8 Speech recognizer circuit
 9 Controller circuit
 10 Transmitter
 11 Target device to be controlled

12 マイクロボン
 13 音声信号送信回路
 14 プッシュボタンスイッチ
 15 FM解説器送信回路
 16 送信装置
 17 受信装置

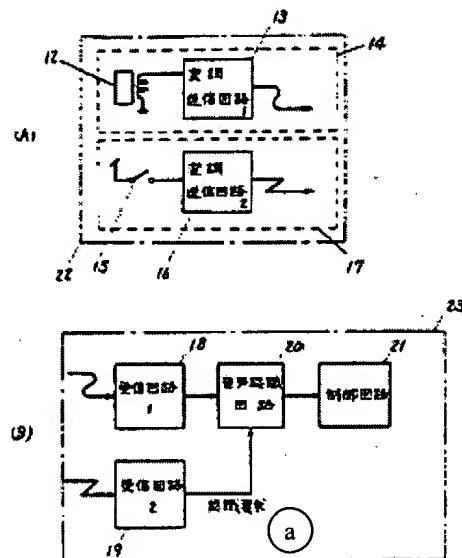


Figure 2

Key: a Recognition request

12 Microphone
 13 Modulator-transmitter circuit 1
 14 Speech signal transmitter circuit
 15 Push-button switch
 16 Modulator-transmitter circuit 2
 17 Recognition request signal transmitter circuit
 18 Receiver circuit 1
 19 Receiver circuit 2
 20 Speech recognizer circuit
 21 Controller circuit
 22 Transmitter
 23 Target device to be controlled